

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph on page 2, beginning at line 12, with the following amended paragraph:

The thermistor 1 is exposed to the air to allow water vapor to be in contact with a surface of the thermistor 1 by means of a fine hole ~~of~~ in the metal shield case 5. The thermistor 1 is used as a sensing element. The other thermistor 2 is sealed in a dry N₂ atmosphere by the metal shield case 5 so as not to be in contact with the water vapor. The thermistor 2 is used as a reference element.

Please replace the paragraph on page 3, beginning at line 4, with the following amended paragraph:

Furthermore, the thermistor element is floating using the conductor 3 and the support pin 4 as shown in Fig. 1, and the conductor 3 and the pin 4 are spot-welded. For assembly, the reference element 2 should be sealed in a dry N₂. For this reason, the fabrication process steps are ~~complicate~~ complicated and the number of the process steps increases. Also, the cost is expensive and mass production is disadvantageous.

Please replace the paragraph on page 4, beginning at line 17, with the following amended paragraph:

A thermal conductive film may further be formed on a region of the passivation film where the resistor is formed. At this time, the thermal conductive film is formed ~~on~~ of any one of Al and Au.

Please replace the paragraphs beginning on page 7 at line 4 to page 8, line 12, with the following amended paragraphs:

In the drawings:

Fig. 1 is a structural sectional view showing a background art of an absolute sensor;

Fig. 2 is a structural sectional view showing a membrane type absolute humidity sensor according to the first embodiment of the present invention;

Fig. 3 is a structural sectional view showing a package of the membrane-type absolute humidity sensor according to the first embodiment of the present invention:

Fig. 4 is a structural sectional view showing a membrane type absolute humidity sensor according to the second embodiment of the present invention;

Fig. 5 is a structural sectional view showing a package of the membrane type absolute humidity sensor according to the second embodiment of the present invention;

Figs. ~~6a~~ 6A and ~~6b~~ 6B are structural perspective views showing the package of the membrane type absolute humidity sensor according to the second embodiment of the present invention;

Fig. 7 is a structural sectional view showing a membrane type absolute humidity sensor according to the third embodiment of the present invention;

Figs. 8a 8A and 8b 8B are structural perspective views showing the membrane type absolute humidity sensor according to the third embodiment of the present invention;

Figs. 9a and 9e 9A through 9C are sectional views showing process steps of fabricating a silicon cap of the membrane type absolute humidity sensor according to the third embodiment of the present invention;

Figs. 10a 10A and 10b 10B are structural perspective views showing a package of the membrane type absolute humidity sensor according to the third embodiment of the present invention; and

Fig. 11 is a circuit diagram for detecting humidity based on the membrane type absolute humidity sensor according to the present invention.

Please replace the four paragraphs on page 9, beginning at line 6, with the following four amended paragraphs:

An insulating A passivation film 15 is formed on the resistor 13 to cover the resistor 13.

At this time, the insulating passivation film 15 is formed of a material having excellent insulating characteristics, such as SiO₂, Si₃N₄, SiO_xN_y, a PSG, and polyimide.

Next, a metal film such as Al or Au is deposited on the ~~insulating~~
passivation film 15 and then patterned to form a thermal conductive film 16 to
be aligned with the resistor 13.

The thermal conductive film 16 acts to quickly emit heat ~~of~~ from the
resistor 13 to the outside. The thermal conductive film 16 may not be formed
as the case may be.

Please replace the paragraph on page 10, beginning at line 15, with the
following amended paragraph:

A hole is formed in a region of the metal shield case 25, where the
absolute humidity sensor 21 for the humidity sensing element is formed, to
pass through external humidity. A dry N₂ gas is filled in a region of the metal
shield case 25, where the absolute humidity sensor 22 for the temperature
compensating element is formed, so as not to be affected by the external
humidity.

Please replace the three paragraphs on page 11, beginning at line 15,
with the following three amended paragraphs:

An ~~insulating~~ A passivation film 35 is formed on the resistors 33a and
33b to cover entire surfaces of the resistors 33a and 33b.

At this time, the ~~insulating~~ passivation film 35 is formed of a material
having excellent insulating characteristics, such as SiO₂, Si₃N₄, SiO_xN_y, a PSG,
and polyimide.

Also, a thermal conductive film of Al or Au may be formed on the insulating passivation film 35, to be aligned with the resistors 33a and 33b, as the case may be.

Please replace the two paragraphs on page 12, beginning at line 7, with the following two amended paragraphs:

Fig. 5 is a structural sectional view showing a package of the membrane type absolute humidity sensor according to the second embodiment of the present invention, and Figs. 6a 6A and 6b 6B are structural perspective views showing the package of the membrane type absolute humidity sensor according to the second embodiment of the present invention.

As shown in Figs. 5, 6a 6A and 6b 6B, an absolute humidity sensor provided with a humidity sensing element 41 and a temperature compensating element 42 is joined on a stem 43. Pins 44 are formed on the stem 43 to electrically connect with the outside. Electrode pads are formed in the humidity sensing element 41 and the temperature compensating element 42. The pins 44 are respectively connected with the electrode pads by wire.

Please replace the paragraph on page 13, beginning at line 4, with the following amended paragraph:

A hole is formed in only a region of the stem 45, 43, where the humidity sensing element is formed, to pass external humidity through the membrane.

A region, where the temperature compensating element 42 is formed, is sealed with the substrate 31 so as not to be affected by the external humidity.

Please replace the four paragraphs beginning on page 13, line 12 to page 14, line 10 with the following four amended paragraphs:

Fig. 7 is a structural sectional view showing a membrane type absolute humidity sensor according to the third embodiment of the present invention, and Figs. ~~8a and 8b~~ 8A and 8B are structural perspective views showing the membrane type absolute humidity sensor according to the third embodiment of the present invention.

As shown in Figs. 7, ~~8a and 8b~~, 8A and 8B, a membrane 52 is formed on the silicon substrate 51. A resistor 53a for the humidity sensing element and a resistor 53b for a temperature compensating element are formed on the membrane 52. The resistors 53a and 53b are formed of one or more of Ti, Pt, Ni, Ni-Cr, and VO₂.

Subsequently, an electrode pad 54 is formed to be in contact with the resistors 53a and 53b. ~~An insulating~~ A passivation film 55 is formed on the resistors 53a and 53b to cover entire surfaces of the resistors 53a and 53b.

At this time, to quickly emit heat the resistors 53a and 53b, as the case may be, a thermal conductive film 55a of Al or Au may be formed on the ~~insulating~~ passivation film 55, to be aligned with the resistors 53a and 53b.

Please replace the paragraph on page 14, beginning at line 13 with the following amended paragraph:

Finally, a silicon cap 56 is sealed and joined in an upper portion of the insulating passivation film 55 to cover entire surfaces of a humidity sensing element 61 and the temperature compensating element 62.

Please replace the paragraph on page 14, beginning at line 20, with the following amended paragraph:

A hole is formed in a region of the silicon cap 56, where the humidity sensing element 61 is formed, to pass through external humidity. A dry N₂ gas is filled in a region of the silicon cap 56, where the temperature compensating element 62 is formed, so as not to be affected by the external humidity.

Please replace the four paragraphs on page 15, beginning at line 6, with the following four amended paragraphs:

Figs. ~~9a and 9c~~ 9A through 9C are sectional views showing process steps of fabricating the silicon cap of the membrane type absolute humidity sensor according to the third embodiment of the present invention.

As shown in Fig. 9a, 9A, first and second etching mask films 71 and 72 are formed at both sides of a silicon substrate 70. The first and second etching mask films 71 and 72 are formed of Si₃N₄ or CrN.

Subsequently, as shown in Fig. 9b, 9B, a predetermined region of the first etching mask 71 is removed to expose the silicon substrate 70. The

exposed silicon substrate 70 is then etched at a predetermined depth by a wet or dry etching method.

As shown in Fig. 9e, 9C, a predetermined region of the second etching mask 72 is removed to expose the silicon substrate 70. The exposed silicon substrate 70 is then etched by the wet or dry etching method to form first and second recess regions. At this time, the silicon substrate 70 is etched at a depth joined with a lower portion of the silicon substrate etched in the step of Fig. 9b. 9B.

Please replace the two paragraphs on page 16, beginning at line 6, with the following two amended paragraphs:

Figs. ~~10a and 10b~~ 10A and 10B are structure perspective views showing a package of the membrane type absolute humidity sensor according to the third embodiment of the present invention.

As shown in Figs. ~~10 and 10b~~, 10A and 10B, an absolute humidity sensor provided with a humidity sensing element 61 and the temperature compensating element 62 is joined on a stem 63. Pins 64 are formed on the stem 63 to electrically connect with the outside. Electrode pads are formed in the humidity sensing element 61 and the temperature compensating element 62. The pins 64 are respectively connected with the electrode pads by wire.

Please replace the paragraph on page 16, beginning at line 19, with the following amended paragraph:

Unlike the first embodiment, a shielding film is not formed in the metal shield case 65. A hole is formed in the metal shield case 65 to pass through the external humidity. That is, the external humidity is propagated into a region, where the humidity sensing element 61 is formed, through the hole of the metal shields case 65 and the hold hole of the silicon cap 56.

Please replace the three paragraphs beginning on page 17 at line 19 to page 18, line 5, with the following three amended paragraphs:

At this time, a resistor of the humidity sensing element 61 is self-heated by a bias voltage. Accordingly, the water vapor contacted with the humidity sensing element 61 absorbs heat of the resistor. For this reason, the resistor ~~of~~ from the humidity sensing element 61 has a reduced temperature by heat loss, thereby varying a resistance value.

However, since the temperature compensating element 62 does not contact ~~with~~ the water vapor, variation of a resistance value does not occur.

The resistance variation of the humidity sensing element 61 causes an output variation of the bridge circuit, thereby detecting the humidity variation.